

California Environmental Protection Agency



PROPOSED AMENDMENTS TO:

Vapor Recovery Test Procedure

TP-201.1D

**Pressure Integrity Leak Rate of
Drop Tube Overfill Prevention Devices**

Adopted: February 1, 2001

Amended: July 3, 2002

Amended: _____

Note: The text is shown in ~~strikeout~~ to indicate text that is proposed for deletion and underline to indicate text that is proposed for addition. [Bracketed text] is not part of the proposed amendments.

**California Environmental Protection Agency
Air Resources Board**

Vapor Recovery Test Procedure

TP-201.1D

**Pressure-Integrity Leak Rate of
Drop Tube Overfill Prevention Devices**

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "CARB" refers to the State of California Air Resources Board, and the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

~~1.1~~The purpose of this procedure is to quantify the leak rate ~~pressure-integrity~~ of overfill prevention devices located in the Phase I product drop tube on two-point Phase I systems. ~~It is also used to quantify the pressure integrity of spill container drain valves when the drain valve is installed so as to drain into the drop tube.~~ When applicable, this procedure is also used to quantify the leak rate of a spill container drain valve which passes liquid directly into the Phase I drop tube.

This procedure is applicable only to those Gasoline Dispensing Facilities (GDF) equipped with an overfill prevention device located in the Phase I product drop tube. It is used during certification and to determine compliance of devices at installed GDF ~~gasoline dispensing facilities~~ with the performance specification for the maximum allowable leakrate as defined in ~~the~~ CP-201 Vapor Recovery Certification Procedure (CP-201).

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

~~2.1~~A compatible product cap is modified to allow the introduction of nitrogen into the Phase I drop tube. A pressure-measuring device is connected to the modified cap. If the resulting measured nitrogen flowrate necessary to maintain a steady-state pressure of 2.00 inches H₂O is less than, or equal to, the maximum allowable leakrate the overfill prevention device is verified to be in compliance with the specification. In the case where a spill container drain valve passes liquid directly into the Phase I drop tube is installed, the components are isolated from each other with use of an inflatable plumber's bladder in order to determine the leak rate of each device.

~~2.2~~If the introduction of nitrogen, at a flowrate equal to the maximum allowable leakrate, does not result in a steady state pressure that meets, or exceeds, the value specified in CP-201, the Phase I product adaptor is inspected and tested. Any leaks attributable to the Phase I product adaptor are corrected and the test is repeated to ensure the measured pressure versus flowrate is attributable only to the overfill prevention device or, if applicable, the spill container drain valve.

3. BIASES AND INTERFERENCES

- 3.1** Missing or defective gaskets on the Phase I product adaptor, or a loose adaptor, may bias the results towards noncompliance. ~~This bias is eliminated by testing the Phase I product adaptor for leaks.~~ Prior to final determination of the compliance status of the overfill prevention devices, verify that the gasket is intact and that the adaptor is properly tightened.
- 3.2** Refueling during the test may bias the results. No vehicle refueling or bulk deliveries to any of the tanks at the facility shall occur during ~~this test~~ testing.
- 3.3** Product levels less than four (4) inches above the highest opening at the bottom of the submerged drop tube may bias the ~~test results~~ toward non-compliance.
- 3.4** Positive gauge pressure in the storage tank headspace may bias the results toward compliance. Use the Pressure Relief Adaptor in Section 5 to eliminate this potential bias.
- ~~3.43.5~~ **3.5.3.5** Liquid levels in the drop tube that are above the location of the overfill prevention device will bias the results toward compliance.
- ~~3.53.6~~ **3.6.3.6** Leaks in the test equipment will bias the results toward noncompliance. Prior to conducting the test, this bias is eliminated by conducting a leak check of the test equipment. Leak detection solution may also be used during the test to verify the absence of leaks in the test equipment.
- ~~3.63.7~~ **3.7.6.3.7** Use of this procedure to quantify the leak rate of spill container drain valves that drain liquid into the ullage of the storage tank rather than into the drop tube will yield invalid results.

4. SENSITIVITY, RANGE, AND PRECISION

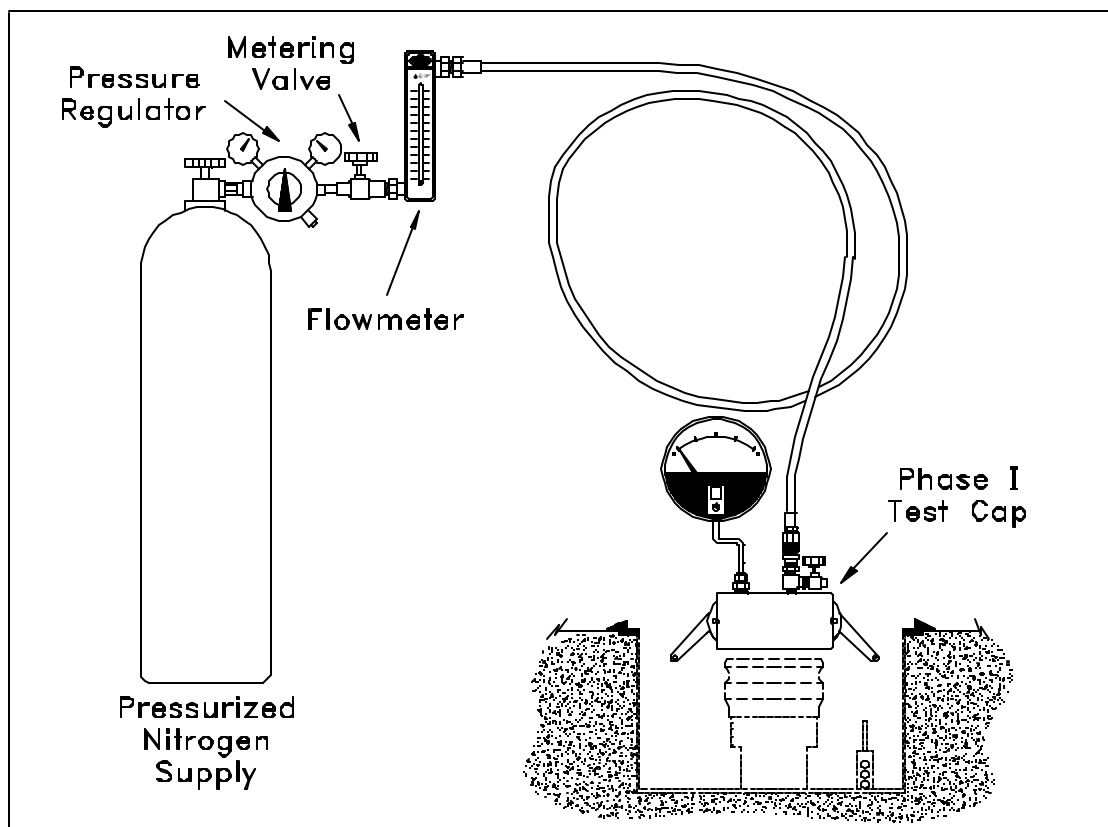
- 4.1** The measurable leak rates are dependent upon the range of the flowmeter used for the test. The recommended flowmeter range specified in Section 5.1 provides sufficient precision at the maximum allowable leakrate defined in CP-201.
- 4.2** The sensitivity of the pressure measuring device is 0.01 inches H₂O for electronic pressure measuring devices and 0.05 inches H₂O for mechanical pressure gauges.

5. EQUIPMENT

- 5.1** ~~Drop Tube Pressure Integrity Leak Rate Test Assembly and Cap.~~ Drop Tube Pressure Integrity Leak Rate Test Assembly and Cap. Use a modified product cap compatible with the Phase I product adaptor. Use a product cap compatible with the Phase I product adaptor. The cap shall be equipped with a pressure tap and a flowmeter capable of measuring flowrates equal to the maximum allowable leakrate specified in CP-201 and three times the maximum allowable leakrate. The maximum allowable full-scale range for the flowmeter shall be 1.0 CFH. The flowmeter shall be calibrated for use with nitrogen. An example of a complete ~~Drop Tube Pressure Integrity Leak Rate Test Assembly~~ Drop Tube Pressure Integrity Leak Rate Test Assembly is shown in Figure 1. An example of a Product Cap Test Assembly is shown in Figure 2.

- 5.2 Pressure Measuring Device.** Use a pressure-measuring device to monitor the pressure in the drop tube.
- 5.2.1** If an electronic pressure-measuring device is used, the maximum fullscale range of the device shall be 10 inches H₂O. The minimum accuracy shall be 0.5 percent and the pressure measuring device shall be readable to the nearest 0.01 inches H₂O.
- 5.2.2** If a mechanical pressure-measuring device is used, the maximum fullscale range shall be 5 inches H₂O. The minimum accuracy shall be 1.0 percent and the minimum graduations shall be 0.05 inches H₂O. The minimum diameter of the pressure gauge face shall be 4 inches.

Figure 1
Drop Tube Pressure Integrity Leak Rate Test Assembly

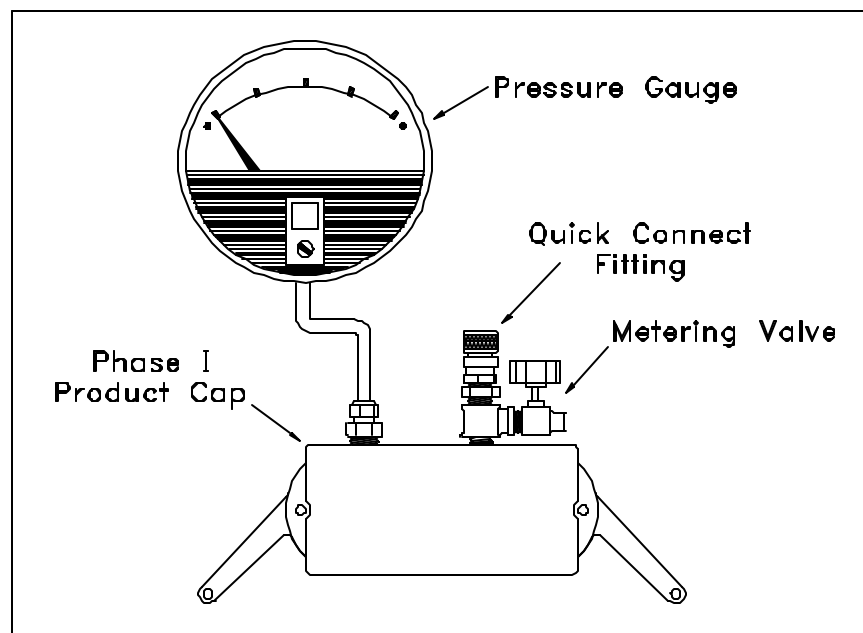


- 5.3 Nitrogen.** Use commercial grade gaseous nitrogen in a high-pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.
- 5.4 Stopwatch.** Use a stopwatch accurate to within ~~0.2~~ 0.10 seconds to time the ~~duration of the test~~ pressurization of the drop tube and the one-minute pressure stabilization period.
- 5.5 Leak Detection Solution.** Any commercial liquid solution designed to detect vapor leaks may

be used to verify the pressure integrity of the Phase I product adaptor during this test.

- 5.6** Vapor Poppet Pressure Relief Assembly. Use an assembly or a compatible vapor recovery elbow to open the Phase I vapor poppet during the test. This will ensure that the pressure on the underground storage tank (UST) side of the overfill prevention device is at zero gauge. An example of a Vapor Poppet Pressure Relief Assembly is shown in Figure 3. Screwdrivers or other devices that may damage the poppet gasket shall not be used to open the Phase I vapor adaptor poppet.
- 5.7** Inflatable Plumber' Bladder. Use a "3-4" ~~modelinch diameter~~ inflatable plumber's bladder and extension hose equipped with a safety chain, as shown in Figure 4, to isolate the drain valve from the Overfill Prevention Device when applicable. The safety ring must be removable, allowing the tester to remove the ring following inflation and attach the ring prior to deflation.
- 5.8** ~~Traffic Cones or Caution Tape. Use traffic cones or caution tape to encircle the area containing the Phase I manholes while the test is being conducted.~~
- 5.95.8** Tank Gauging Stick. Use a tank gauging stick of sufficient length to verify that the UST liquid level is at least four (4) inches above the highest opening at the bottom of the submerged drop tube. The tank gauging stick shall be equipped with a non-sparking "L" bracket at the end.

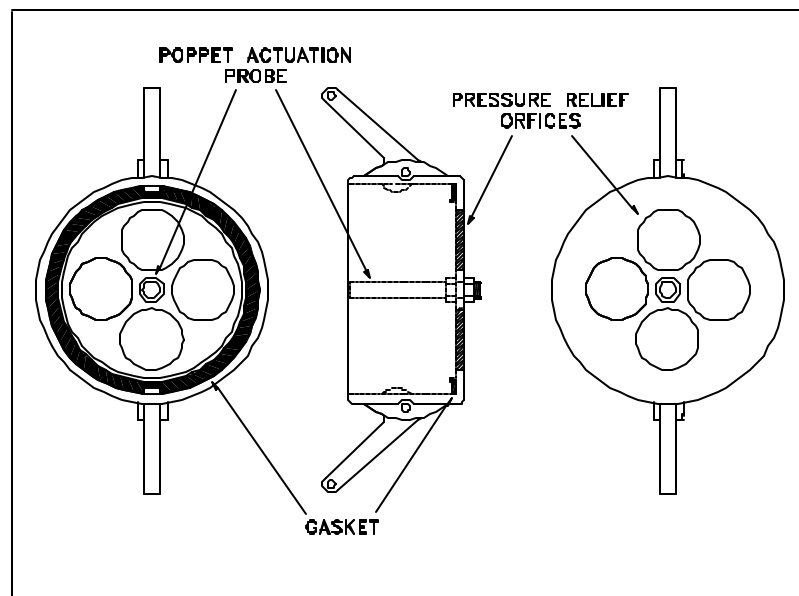
Figure 2
Product Cap Test Assembly



6. PRE-TEST PROCEDURES

- 6.1** The flowmeter and pressure-measuring device shall be calibrated within the 180 days prior to conducting the testing. The flowmeter(s) shall be calibrated for use with nitrogen. Calibrations shall be conducted in accordance with EPA or CARB protocols. CARB calibration methodology for flowmeters ~~is~~ are contained in Appendix D of Air Monitoring Quality Assurance, Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing, January 1979.
- ~~**6.2** Place the traffic cones or caution tape around the perimeter of the Phase I spill containers allowing sufficient space to safely conduct the test.~~
- 6.36.2** Remove the lids of the Phase I spill containers. Visually determine that the drop tube is equipped with an overfill prevention device. If the drop tube is not equipped with an overfill prevention device, and the drain valve does not drain into the drop tube, the test will only quantify leaks that occur at the Phase I adaptor.
- 6.46.3** Inspect the Phase I product adaptor to ensure that the gasket is ~~intact~~ installed and that the adaptor is securely attached to the Phase I product ~~stem~~ riser.
- 6.56.4** Verify that the liquid level in the storage tank is at least four (4) inches above the highest opening at the bottom of the submerged drop tube using the tank gauging stick.

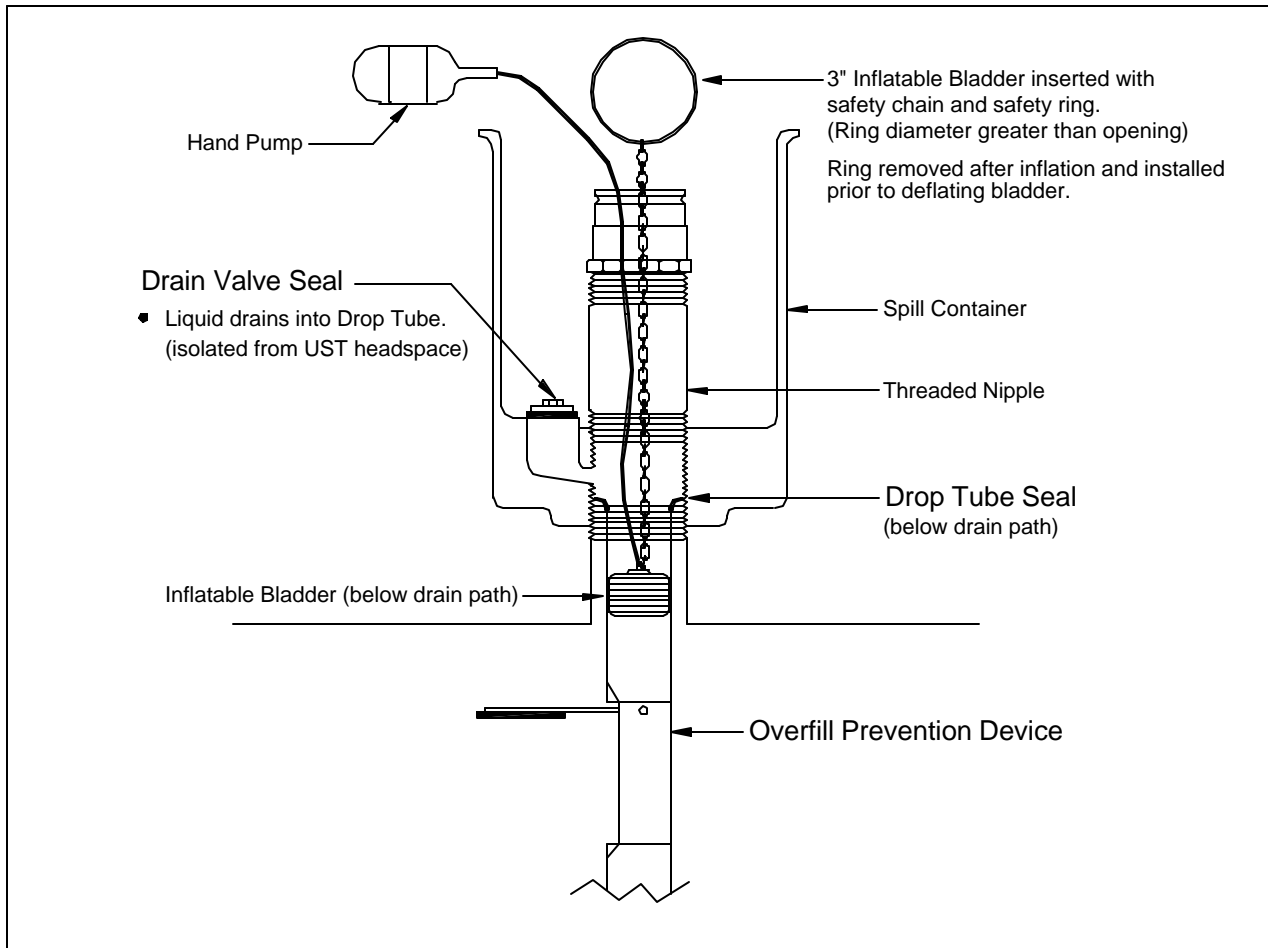
Figure 3
Vapor Poppet Pressure Relief Assembly



- 6.66.5** Inspect the drain valve configuration. Determine whether ~~the drain valve drains liquid passes through the drain valve directly into the drop tube above the Overfill Prevention device, as shown in Figure 4, rather than into the underground storage tank ullage space.~~ If the drain valve drains into the drop tube, the procedure will quantify the leak rate through both the Overfill Prevention Device and the drain valve, and the maximum allowable leak

rate for both devices is the sum of the two individual leak rates.

Figure 4
Inflatable Bladder Installation



7. TEST PROCEDURE

- 7.1 Connect the ~~Drop Tube Pressure Integrity Leak Rate Test~~ Assembly to the Phase I product drop tube as shown in Figure 1. Connect the nitrogen supply line to the inlet of the flowmeter.
- 7.2 Connect the Vapor Poppet Pressure Relief Assembly to the Phase I vapor poppet to bring the UST headspace to atmospheric pressure.
- 7.3 With no vehicle refueling occurring, open the nitrogen supply and adjust the nitrogen flowrate to at least three times the maximum allowable leakrate specified in CP-201, and start the stopwatch. If the Drop Tube assembly includes a drain valve that passes liquid directly into the drop tube, the maximum allowable leakrate is the lower maximum allowable leakrate of the drop tube overfill protection device and the drain valve.

- 7.4** Wait until the pressure measuring device records a pressure between 2.00 and 2.20 inches H₂O.
- 7.4.1 If the pressure does not reach at least 2.00 inches H₂O within 180 seconds, the Drop Tube assembly does not comply with the maximum allowable leakrate specification.
- 7.4.2 If the pressure reaches at least 2.00 inches H₂O, reduce the ~~introduction of nitrogen flowrate~~ to the lower maximum allowable leakrate as defined in 7.4.1~~specified in CP-204~~. Wait until the pressure reaches steady state conditions for at least thirty (30) seconds and record both the nitrogen flowrate and the steady state pressure. If the steady state pressure is less than 2.00 inches H₂O, the Drop Tube assembly does not comply with the maximum allowable leakrate.
- 7.5** Determine the leak rate through the drain valve alone, if applicable. This step may be used to determine the individual leakrate of each component if the assembly did not meet the lower maximum allowable leak-rate as defined in 7.4.1~~and to verify if the leak is attributed to of the drain valve or the overfill prevention device~~.
- 7.5.1 Remove the Product Test Cap from the product adaptor.
- 7.5.2 Carefully install an inflatable plumber's bladder ("3 - 4" inch model) into the drop tube as shown in Figure 4 and inflate. Once inflated, carefully remove the safety ring allowing the chain to rest on top of the bladder and reinstall the Product Test Cap. The drain valve is now isolated from the drop tube overfill prevention device.
- 7.5.3 Conduct the procedure pursuant to sections 7.1 through 7.4.
- 7.5.4 Calculate the flowrate for the drop tube overfill protection device as specified in 9.2.
- 7.6** Compare the final flowrate and pressure with the allowable leak rate specification for the device found in CP-201 in order to verify compliance for the device.

8. POST-TEST PROCEDURES

- 8.1** Carefully remove the ~~Drop Tube Pressure Integrity Leak Rate Test~~ Assembly and the Vapor Poppet Pressure Relief Assembly from the Phase I connections.
- 8.2** If the plumber's bladder is installed, Reinstall the safety ring and deflate and carefully remove it. ~~the inflatable plumber's bladder.~~
- 8.3** Replace the caps on the appropriate Phase I adaptors, and the appropriate lids on the spill containers.
- 8.4** ~~Remove the traffic cones or caution tape from the Phase I area.~~
- 8.58.4** If the steady-state pressure, at a nitrogen introduction rate equal to the allowable leakrate, was not equal to 2.00 inches H₂O, use Equation 9-1 to determine the leakrate at

2.00 inches H₂O.

9. CALCULATING RESULTS

- 9.1** If the flowrate of Nitrogen was at the upper limit of the flowmeter and the measured pressure never reached 2.00 inches H₂O, but was greater than 0.00 inches H₂O, the actual leakrate at a pressure of 2.00 inches H₂O shall be calculated as follows:

$$Q_{2.00} = (2.00)^{1/2} \left[\frac{Q_{actual}}{(P_{actual})^{1/2}} \right] \quad \text{Equation 9-1}$$

Where:

- $Q_{2.00}$ = The leakrate of the ~~drop tube assembly~~ component at 2.00 inches H₂O, cubic feet per hour
 Q_{actual} = The actual ~~introduction~~ flowrate of nitrogen, cubic feet per hour
 P_{actual} = The actual measured steady-state pressure at Q_{actual} , inches H₂O
2.00 = Pressure, inches H₂O

- 9.2** If both a drain valve and drop tube overflow prevention device were tested, subtract the measured flowrate for the drain valve at 2.00 inches H₂O from the measured flowrate of the Drop Tube assembly at 2.00 inches H₂O to determine the flowrate of the drop tube overflow protection device. Note: If the final pressure, at the lowest readable flowrate for the drain valve, did not stabilize at 2.00 inches H₂O, this calculation will not be valid.

10. REPORTING RESULTS

- ~~10.1~~ Report the results of the quantification of the leakrate through the drain valve and the drop tube overflow prevention assembly device as shown in indicated on Form 1. Districts may require the use of alternate forms, provided they include the same minimum parameters as are identified on Form 1.

11. ALTERNATE PROCEDURES

- ~~11.1~~ This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 14 of CP-201 Vapor Recovery Certification Procedure CP-201.

Form 1 [Form 1 is to be replaced with new Form 1 shown on next page]

Field Data Sheet
Drop Tube Overfill Prevention

Facility:		Test Date:		Tester(s):	
Address:			City:		Zipcode:
Make & Model of Overfill Prevention:				Phase II System Type:	
Date of Last Flowmeter Calibration:			Date of Last Pressure Device Calibration:		

Test Results

Product Grade	N ₂ Flowrate (Overfill Only) (CFH)	Pressure (in. H ₂ O)		N ₂ Flowrate (Overfill + Drain Valve) (CFH)	Pressure (in. H ₂ O)	N ₂ Flowrate (Drain Valve Only) (CFH)	Pressure (in. H ₂ O)	Difference (Overfill Leakrate) (CFH)

<i>Comments:</i>

Form 1

Drop Tube Overfill Prevention Device and Drop Tube/Drain Valve Assembly Data Sheet

Facility:	Test Company:	Test Date:
Address:	Test Personnel:	
City:	State, Zip Code	
Overfill Prevention Make & Model:	Spill Container Make & Model:	
Date of Last Flowmeter Calibration:	Date of Last Pressure Gauge Calibration:	

Test Results

Device Type & Product Grade	Time to Pressurize	1-Minute FlowRate (CFH)	1-Minute Pressure (in. H ₂ O)	Corrected FlowRate For Overfill Device Only (See Section 9.2)

Comments:

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